ent degrees of force, I have found that the most violent wind traverses scarcely 60 miles an hour. For example, on the 11th of August, 1705, the violence of the wind excited such a tempest that it almost overturned the windmill itself near the spot where I made my observations. [The different degrees of the force of the winds, as has just been seen, I have for the most part noted by these figures: 0, 1, 2, 3, 4, 5, 6, up to 10, 15, or still higher degrees.] Now I have estimated that the force of the above indicated wind answers to about 12 or 14 of these degrees. And from very many reiterated experiments I have concluded that that tornado traversed about 33 feet in a half second, or 45 miles in an hour; hence I gather that the fleetest and most tempestuous winds (that violent wind which raged in the month of November, 1703, not being excepted) do not traverse more than 50 or 60 miles an hour.

After we have measured the velocity of the rapid winds, it is not difficult to conjecture what may be the velocity of less rapid ones; for I have also marked the course of these, and from various experiments I have convinced myself that some of them accomplished 15, some 13, others many less miles per hour; while some are propagated with such a slow motion that they move scarcely a single mile an hour. Moreover, other winds are so sluggish that one may easily outstrip them while making a journey on horseback or on foot. This fact is apparent to our senses, for when we arrest our steps we perceive a soft breeze gently fanning us, but if we advance with it we feel none at all; while if we quicken our pace instead of a breeze accompanying us and blowing in the same direction with our movement, we plainly feel the air resisting us, and blowing full in our faces. Likewise when the atmosphere is entirely quiescent and stagnant, if we chance to be walking or riding on horseback, we then perceive a gentle breeze pressing against us, with such degrees of force, in fact, as correspond to the rates of our own motion. And a breeze of wind or current of air is borne with the same rate of motion or velocity when it presses against us with an equal impetus as we stand still, or linger in our track.

From these observations about the velocity of winds very many things, not without utility, might be noted, but especially might we assign in view of them, one reason why the mercury rises and falls for such a long time before clear weather or rain sets in.

But I will omit these considerations as being foreign to my purpose, and this only will I observe as to sounds, to wit, that while their motion is accelerated by wind it is plain that those parts of the atmosphere by which sounds are impressed or propagated are not the same as those from which winds are blown, but certain other more ethereal and volatile parts, as one may suppose. For the fleetest winds do not pass through more than 60 miles in an hour, but sounds travel more than seven hundred thousand paces, or 778 miles in the same time.

But if it be objected that winds do accelerate or retard sounds it is to be answered that this does not only proceed from the current or tendency of the windy particles alone, but rather from the conjoint and cooperating motion of all the particles of the atmosphere, both the thicker and the ethereal. If the direction of this course or motion favors the waves of sound it is altogether in accordance with probability that the impulse of sounds should be accelerated by this cause, but if the direction is adverse that, the impulse should be retarded.

Having shown that the velocity of sound under ordinary conditions of the atmosphere in England averages 1,142 feet per second, Derham enumerates many practical applications of this knowledge, and concludes: "Finally, in this way the height of thunderclouds and the distance of the thunder and lightning itself may be easily ascertained."

THE CHINOOK IN OREGON.

The morning map of Thursday, December 3, at Portland, Oreg., contains the following predictions by B. S. Pague, Local Forecast Official:

Chinook winds are prevailing over Washington, Oregon, Idaho, and Montana this morning. The temperature is from 46° to 50°, west of the Cascades, and from 24° to 22° to the east of them.

The storm area extends from the ocean off northwestern Washington over British Columbia and northern Washington. An area of high pressure is central about Salt Lake, and the flow of air from the high to the low causes the chinook winds by dynamic heating.

Chinook winds are not warm winds from the ocean, but air made warm by the compression produced by the flow from the mountain heights of Nevada, Utah, and southern Idaho, to the lower lands extending north-northeastward and northwestward to the area of low barometric pressure. The map this morning shows the distribution of atmospheric pressure necessary to produce chinook winds over the northwestern portions of the United States. These winds are most welcome for they will clear the snow blockades which have closed the railroads and will remove the snow from the stock ranges.

Warm chinook weather will prevail for the next thirty-six hours.

The chinook prevailing this (Thursday) morning was indicated in the Tuesday morning's report, and was telegraphed out Wednesday morning.

In the above paragraph Mr. Pague has used the word chinook in its ordinary meteorological acceptation. It would be interesting to learn whether the popular usage in Oregon, Washington, and British Columbia agrees with that of the meteorologist.

MEXICAN CLIMATOLOGICAL DATA.

In order to extend the isobars and isotherms southward so that the students of weather, climate and storms in the United States may properly appreciate the influence of the conditions that prevail over Mexico the Editor has translated the following tables from the current numbers of the *Boletin Mensual* as published by the Central Meteorological Observatory of Mexico. The data there given in metric measures have been converted into English measures. The barometric means are as given by mercurial barometers under the influence of local gravity, and therefore need reductions to standard gravity, depending upon both latitude and altitude; the influence of the latter is rather uncertain, but that of the former is well known. For the sake of conformity with the other data published in this REVIEW these corrections for local gravity have not been applied. One additional station, Topolobampo, is published at the end of Table II.

Mexican data for November, 1896.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	Inch.	° F.	° F.	° F.	%	Inch.		
Campeche									
Colima (Seminario)	1,600	28.26	90.5	57.7	76.3	70	0.39	wsw.	s. & w.
Colima					77.7				
Guadalajara (O. d. E.)	5,141	25.00	77.7	39.4	64.8	80	3.44	se.	w.& nw.
Guanajuato	6,761	23.70	79.2	49.3	62.2	58	1.44	ene.	sw.
Jalapa	4,757	25.56	83.5	43.0	66.0	84	5.21	n.	
Lagos	6,275	24.17	77.9	39.0	60.3	66	1.70	nw.	nw.
Leon	5,901	24.32	78.3	43.9	61.7	62	1.06	ssw.	w.
Magdalena (Sonora)					64.2		0.28	ne.	n.
Mazatlan	25	29.91	84.6	62.1	76.6	77	0.00	nw.	sw.
Merida	50	29.92	94.3	67.6	78.1	81	4.62	ne.	e.
Mexico (Obs. Cent.)	7,489	23.09	72.0	47.3	58.5	68	0.80	nw.	ne.
Mexico (E. N. de S.)	7,480								
Morelia (Seminario)	6,401	23.98	75.2	46.9	58.5	73	1.31	ssw.	w.
Oaxaca	5,164	25.08	84.7	49.1	67.3	65	2.93	nnw.	ne.
Pabellon	6,312								
Pachuca	7,956	22.55	78.4	39.2	55.9	73	0.40	ne.	ne.
Puebla (Col. d. Est)	7,118								
Puebla (Col. Cat.)	7,112	23.38	76.1	48.2	61.3	66	1.61	e.	ne.
Queretaro	6,070								
Saltillo (Col. S. Juan)	5,377	24.93	77.5	24.4	58.6	77	2.40	n.	n.
San Luis Potosi	6,202	24.16	74.3	40.1	61.7	67	1.28	e.	w.
Silao	6,063	24.30	73.8	50.7	64.6	69	0.72	w.& nw.	w.
Tacambaro									
Tacubaya (Obs. Nac.)	7,620								
Tampico (Hos. Mil.)	38								
Tehuacan	5,453								
Toluca	8,612	21.91	70.2	38.8	52.5	76	1.34	w.	
Trejo (Hac. Sil., Gto.)	6,011						0.91		
Veracruz	48	30.02	86.9	61.0	75.4	77	9.84	nne.	nne.
Zacatecas	8,015	22.54	76.6	26.6	57.0	67	0.43	sw.	sw.
Zapotlan (Seminario)	5,125								

In order that there may be no doubt as to the altitudes of the barometers at these Mexican stations, the Editor has solicited some information from Professor Bárcena, as mentioned on page 421 of the previous number of the REVIEW, and takes pleasure in publishing the following reply:

CENTRAL METEOROLOGIC-MAGNETIC OBSERVATORY,

Mexico, January 15, 1897.

Prof. CLEVELAND ABBE,

Weather Bureau, Washington, D. C.

DEAR SIR: In the absence of Prof. Mariano Bárcena, Director of this Bureau, I have the honor to answer your letter of January 6.

All the elevations of the table are accurately determined and the barometers are in the best possible condition. The altitudes given those of the cisterns of the barometers. In Mexico this altitude is 17.5 meters above the ground; in Puebla, 15.0; in Mazatlan, 7.5; in Merida, 8.5; in other localities the barometers are a very few meters above the ground. The altitude of Colima is in error; the only good one is 488 meters, or 1,600 feet.*

I have the honor to be truly yours,

(Signed) J. ZENDEJAS, *Vice Director.*

[* We, therefore, retain the figures 487.7 meters, or 1,600 feet given in the *Boletin Mensual* for June and November, 1896, and request the reader to make the necessary changes on pages 14, 44, 123, 206, 290, 374, 421.—ED.]

PRODUCTION OF RAIN BY GREAT FIRES.

In the early part of the century Professor Espy excited great interest by his lectures on the formation of clouds, rain, and storms, and several, but not many, instances were quoted in which fires in the forest or canebrake were known to have actually produced local rains. An experiment made by Espy, near Washington, was not successful, and, indeed, it is conceded that a very moist condition, or a generally unstable condition of the air, is needed in order to produce a favorable result. It will, perhaps, be of interest to find that attention had been called to this matter before Espy's time. Thus, in the London Philosophical Transactions for 1708 (see Hutton's Abridgment, Vol. V, p. 403) the Archbishop of Dublin says:

There are three ways of reducing heath and bog to arable land (in the counties of Londonderry and Donegal): the first is by cutting off the scurf of the ground, making up the earth so cut in heaps, and when the sun has dried them setting them on fire; when burnt as much as they can be the heaps are scattered on the ground, and, after plowing it produces barley, rye, or oats, for about three years. The inconveniences of this method are (1) that the burning defiles the air, causes rain and wind, and is not practicable in a wet summer. * * *

It may be of historical interest to collect other references to the connection between large fires and subsequent rainfall.

INTERNATIONAL CLOUD OBSERVATIONS.

It is well known that, under the auspices of a special international committee, the principal weather bureaus of the world are now making a systematic effort to improve our knowledge of the altitudes and motions of the clouds. From a recent letter to the cloud committee we learn that the stations occupied in North America are as follows:

CANADA.—Toronto, where the altitudes are determined by triangulation.

THE UNITED STATES.—Blue Hill, Mass. (*i.e*, the observatory of Mr. A. L. Rotch), where the altitudes of the clouds are determined by triangulation, and the movements by the nephoscope; the United States Weather Bureau, Washington, D. C., where triangulation and the nephoscope are both employed; in addition to this central station, simple nephoscope observations are made at other Weather Bureau stations as follows: Baker City, Oreg.; St. Paul, Minn.; Kansas City, Mo.; Abilene, Tex.; Vicksburg, Miss.; Louisville, Ky.; Key West, Fla.; Cleveland, Ohio; Detroit, Mich.; Buffalo, N. Y.; also a short series by the voluntary observer, Frank W. Proctor, Waynesville, N. C.

At Washington the exact heights of the clouds and the directions and velocities of their motions are computed from observations of altitude and azimuth made simultaneously by two observers stationed at points about 4,465 feet apart. No attempt has been made to employ any photographic methods. The observers are instructed to confine their attention to a space that is 15° from the base line and from the horizon. Within this space simple trigonometrical formulæ are applied after rejecting the observations that do not conform to obvious criteria. The settings are made at intervals of two minutes and in pairs, if possible; single readings are avoided when practicable. This method fails when applied to stratus formations, except fracto-stratus, but the main problem of the American atmospheric circulation does not suffer in its solution on that account. When weather permits three series of ten settings each are taken daily, and the total will be sufficient to discuss the problem on the different levels with accuracy. It is not expected that any more stations for special cloud observations will be established by the Weather Bureau during the coming year.

RIPPLE CLOUDS OF ALTO-CUMULI.

Mr. Frank W. Proctor communicates the following observations on alto-cumuli clouds, made at Waynesville, among the mountains of North Carolina, and which were at that time thought by him to be of interest in connection with the formation of ripple clouds. The observations were made by means of the nephoscope, in accordance with the scheme now being carried out at a number of Weather Bureau stations:

Alto-cumuli clouds observed at Waynesville, N. C., July 28, 1896.

Local mean time, a. m.	Seen in azimuth.	Angular elevation.	Azimuth of motion.	Velocity, apparent.		Velocity computed for altitude of 1 mile.		Velocity computed for altitude of 1,000 meters.		Direction of motion.
				Millimeters.	Seconds.	Meters per second.	Miles per hour.	Meters per second.	Miles per hour.	
h. m.	°	°	°							
8 55	2	74	115	7.0	25	3.7	8.4	2.33	5.2	ene.
59	20	51	115	7.0	25	3.7	8.4	2.33	5.2	ene.
9 05	338	68	115	6.0	25	3.2	7.2	2.00	4.5	ene.
08	219	72	115	6.2	25	3.3	7.4	2.07	4.6	ene.
12	304	73	98	6.2	25	3.3	7.4	2.07	4.6	e. by n.
14	325	72	94	6.2	25	3.3	7.4	2.07	4.6	e.
17	198	83	94	5.7	25	3.0	6.8	1.90	4.3	e.

This cloud formation is a dense, white, opaque sheet, made by individual alto-cumuli of considerable size, in close contact and overlapping. Toward the edge of the formation the individual alto-cumuli are smaller and farther apart and, it is believed, somewhat higher. Observations 1, 2, 3, and 4 were made on the bottom of the mass, near its center; Nos. 5, 6, and 7 were made on the smaller cumuli on the edges, none of which were in contact. It is believed that these observations give very closely the azimuth of motion of the air currents at the top and at the bottom of this cloud mass, viz: top, 96°; bottom, 115°.

[In connection with these interesting observations by Mr. Proctor, the Editor takes the liberty of remarking that it is not apparent that the observations of velocity can be made with sufficient accuracy, or that the edges of the clouds can be seen with sufficient distinctness to warrant the hope that we can determine the relative velocity of the upper and lower surface of a thin sheet of alto-cumulus ripples. For instance, the lower surface of the clouds here observed must have had an altitude of at least 2,000 feet above the observer, while the upper surface may have been 2,500 feet, therefore, the same actual velocity at the top and bottom would give apparent velocities a little greater for the lower surface in the ratio of 2,000 to 2,500, or the angular velocity of the upper surface would be four-fifths of that of the lower surface; this ratio would, of course, vary with the actual height and thickness of the cloud layer. Mr. Proctor's observations, above given, seem to show some such relation as this, and it would require many observations of great accuracy to establish the fact that the upper surface has an actual motion of progression either greater or less than the lower surface. And yet one can not doubt but that this often happens; in the case of tall cumuli, such differences are apparent to the nephoscope but for shallow layers of alto-cumulus the fact could best be established either by the trigonometrical or the photographic methods of cloud observation. As the observations quoted by Mr. Proctor were all within 40° of the zenith, it is quite plausible that the first four observations differed from the last three both in the direction and velocity of motion, not because they related to points at the top and bottom of the stratum, but to points near the center and the edges of the field or sheet of alto-cumuli.—ED.]